

Amendments to the Specification

Please replace paragraph [0014] with the following amended paragraph:

[0014] Embodiments of the invention further provide a spin rinse dry cell that includes a substrate sensing apparatus. The sensing apparatus first includes a light emitter disposed at a point outside of the radius of the substrate. The light emitter directs a beam of light above the surface of the substrate. The sensing apparatus next includes a receiver. In one arrangement, the receiver is a non-reflective receiver that senses the presence of the directed light. The receiver is also disposed outside of the radius of the substrate, but at a point diametrically opposite the light emitter. If the substrate is not resting in a horizontal position along an upper surface of the substrate support members, the receiver does not receive the light generated by the light emitter. This tells the system that the substrate is not or cannot be properly secured, and that rotation of the substrate should not commence.

Please replace paragraph [0027] with the following amended paragraph:

[0027] Figure 7 illustrates [[s]] a cross sectional view of an SRD cell, with a pair of novel circulation breakers placed within the processing volume of the cell.

Please replace paragraph [0038] with the following amended paragraph:

[0038] Figure 3A illustrates a partial perspective and sectional view of an exemplary substrate spin rinse dry cell 300 of the invention. The spin rinse dry cell 300 (SRD) includes a fluid bowl/body 301 supported on a frame that may be attached to a plating system, such as the mainframe 113 illustrated in Figure 1. The SRD 300 further includes a rotatable flywheel 302 centrally positioned in the fluid bowl 301. The flywheel 302 may include a generally planar or curved upper surface that has a plurality of backside fluid dispensing nozzles 308 formed thereon and at least one gas dispensing nozzle 310 formed thereon (also shown in Figure 5 as nozzles 503). These nozzles

308, 310 permit fluid, e.g., deionized water, and gas, e.g., N₂ purge gas, to be applied to the back side of a substrate 304. In one embodiment of the invention, flywheel 302 is covered by a horizontal shield 330 on an upper surface thereof, and by a vertical shield 331 on a side or vertical surface thereof. Both shields 330, 331 are positioned to be stationary and adjacent to the flywheel 302. More particularly, horizontal shield 330 may be attached to the central hub 520 (illustrated in Figure 5) and extend radially outward therefrom. Further, shield 330 may be positioned to essentially float above the rotating flywheel 302 with a space between the rotating flywheel 302 and the shield 330 being between about 1mm and about 5mm, for example. Similarly, vertical shield 331 may be attached to basin shield member 312 and be positioned to be spaced from a vertical edge of the flywheel 302 by a distance of between about 1mm and about 5mm, for example. The positioning of shields 330, 331 is generally configured to minimize the exposed rotating surface area of flywheel 302. More particularly, the exposed surface area 332 of flywheel 302 is a cause of turbulent airflow in cell 300. Since turbulent airflow does not facilitate effective drying of substrates, minimization of turbulent airflow is desired. Thus, in one embodiment of the invention, the exposed rotating surface area of the flywheel 332 is minimized in order to minimize induced turbulence in the airflow within the cell 300.

Please replace paragraph [0051] with the following amended paragraph:

[0051] In operation, the spin rinse dry cell 300 generally operates to receive a substrate therein, rinse the substrate with a rinsing fluid, and dry the substrate via spinning the substrate to centrifugally urge fluid off of the substrate surface, while also dispensing a drying gas into the cell containing the substrate to further facilitate the drying process. A substrate may be positioned in the cell 300 via a door or opening, which may be positioned on one side of cell 300, or alternatively, cell 300 may include more than one door positioned on, for example, opposing sides of the cell, such that substrate may be brought into cell 300 on one side and taken out of cell 300 on another side. Substrates are generally positioned in cell 300 by a substrate transfer robot, such as robot 120 or robot 132 illustrated in Figure 1. Robots generally support the

substrates from the underside, and therefore, when the substrate is transferred into the cell 300, it is generally positioned above the fingers 303. The fingers 303 are actuated to the open position, *i.e.*, the position where the upper surface 404 of the fixed post 401 is exposed. With the upper surface 404 exposed, the robot may lower the substrate onto the plurality of fingers 303 such that the substrate is supported by the upper surface 404 of each of the fingers 303. The upper portion of the fixed posts may include an inwardly inclining surface 410 that is configured to guide the substrate inwardly or center the substrate on the respective posts 401. Once the substrate is positioned on the horizontal surfaces 404, the robot blade may retract from cell 300 and the door may be closed to isolate the interior processing volume of cell 300 from the ambient atmosphere.

Please replace paragraph [0054] with the following amended paragraph:

[0054] Once the substrate is secured to the substrate support assembly 400, processing may begin. Generally, processing in cell 300 will include rinsing and drying the substrate positioned therein. The rinsing and drying processes generally includes rotating the substrate, and therefore, fingers 303 are generally secured to a rotatable-type flywheel 302, as illustrated in Figure 3. Once the substrate is rotating, fluid dispensing nozzles may dispense a rinsing fluid onto the front, back, or both sides of the rotating substrate. Fluid dispensed onto the front side of the substrate may be dispensed by manifold 306 positioned in the lid member 305 (or arm 350), while fluid is dispensed [[to]] onto the back side of the substrate may be dispensed by the fluid apertures 503 formed into the flywheel 302. Although various rinsing solutions suitable for semiconductor processing are contemplated within the scope of the invention, DI and other etchant/cleaning solutions are examples of fluids that may be dispensed onto the substrate in order to rinse and/or clean the surface thereof. Further, and since the substrate is rotating during the process of dispensing the rinsing fluid thereon, the fluid is generally urged radially outward toward the perimeter of the substrate. In this manner that fluid flows off of the bevel edge of the substrate and is collected in the bottom of cell 300. Higher rotation speeds of the flywheel 302 will cause the fluid to flow outward and

off of the substrate surface in a nearly horizontal manner, while lower rotation speeds may be used to allow the rinsing fluid to travel outward across the surfaces of the substrate and slightly wrap around the bevel of the substrate before being spun off by centrifugal force.

Please replace paragraph [0068] with the following amended paragraph:

[0068] The fins 790 are designed to serve as flow circulation breakers. To this end, and as noted above, it has been observed that during the rinse and spin processes, fluid may be inhibited from moving radially outward by the generation of a region of low pressure near the center of the substrate as a result of the rotation of the substrate and flywheel assembly. At lower rotational speeds, when fluid is injected into the center of a rotating substrate on the top side of the substrate, the fluid is urged radially outward along the surface of the substrate until it reaches the bevel edge, where it is then spun off of the substrate by centrifugal force. However, when fluid is directed to the backside of the substrate while the substrate is rotating, e.g., rotating at speeds in excess of 500 rpm, a region of low pressure forms near the center of the substrate. Further, when the drying gas is dispensed into the volume between the substrate and flywheel (generally near the center), a cyclonic air flow pattern (a spiraling and inwardly traveling airflow) generally forms in the low pressure region. This cyclonic airflow pulls air inward toward the low pressure region along the flywheel surface and upwardly toward the substrate. The air is then urges urged outward toward the substrate perimeter. This inward flow of air near the flywheel generally accumulates fluid, e.g., droplets of fluid that may be present on the flywheel surface, during the inward airflow motion. The airflow then carries these droplets upward toward the substrate, where the fluid droplets are prone to redeposit on the substrate surface. When this occurs, the drying process is impeded and the required process spin time is increased.